FINDINGS – EARTHQUAKES AND AIRPORTS

What Are the Threats to Airport Operations Following Future Earthquakes in the Bay Area?

Based on past experience in California and other recent earthquakes, the threats to Bay Area airport operations following future earthquakes fall into four general categories:

- liquefaction damage to airport runways, particularly at San Jose (until the new runways are completed), Oakland, San Francisco, and, perhaps, Moffett Federal Airfield;
- shaking damage to air control and terminal facilities, particularly older facilities that may be present at Oakland, Moffett, Hayward, San Francisco, Half Moon Bay, Buchanan, and Livermore airports;
- power and communications disruptions; and
- disruptions to the transportation systems serving the airports.

Our Airport Systems Can and Should Be Made More Earthquake-Ready!

1. **We need to better understand and mitigate the liquefaction hazard to runways.** Thus, we need to expand on the liquefaction analysis conducted for the runways at the three major airports (OAK, SFO, and SJC) to:
   - gain further information on the vulnerability of other major airports, particularly Moffett Federal Airfield on the Peninsula and Travis Air Force Base in Solano County, and, if feasible, Buchanan, Hayward, and Livermore in the East Bay; and
   - incorporate more recent geotechnical information becoming available for OAK, SJC and SFO.

   We need to ensure that the design of new runways also mitigates liquefaction hazards associated with the connections to the existing runway system. Any runway expansions at SFO and OAK that tie into sections of existing runways which are vulnerable to liquefaction will make the expansions vulnerable as well. Current runway work at SJC is designed to minimize the liquefaction hazard.

2. **We need to improve emergency planning at individual airports and to better coordinate emergency planning among airports and with other forms of transportation.** Some ideas focusing on employees and operations at individual airports are listed at the end of this report. However, airport participation in coordinated emergency planning is also essential. MTC is starting this planning as part of the integrated Trans Response Plan (TRP) for earthquakes.

3. **We need to identify alternate locations capable of handling large commercial and cargo jets after an earthquake should Bay Area commercial airports loose capacity due to road transportation system disruptions, runway damage, or structural damage.** Travis AFB will have increased air and vehicle traffic during the post-earthquake emergency response phase because the federal government plans on using Travis AFB as the primary mobilization center for their response to the disaster. With the normal operations that Travis has in addition to this major role, emergency planners should not believe that Travis has additional capacity for other commercial or cargo needs. Options include neighboring commercial airports (Sacramento, Stockton, Monterey, etc.), as well as larger general aviation airports.

THE ISSUE – WHY WORRY ABOUT AIRPORT DISRUPTIONS FOLLOWING FUTURE EARTHQUAKES IN THE BAY AREA?

Airports Are Part of Our Transportation System

We need our transportation systems to be functional after earthquakes for two principal reasons:

1. Emergency responders need to use transportation systems, including airports, after earthquakes.
2. Transportation system disruptions, including disruptions to airports, can have a severe impact on a region's economy for months, if not years (Brady and Perkins, 1998).

Airports as Intersections

Airports are critical points in our transportation system because they function as intersections, not between two freeways, but between our air space and our land-side transportation. Yet, just as damage to a major interchange or bridge in an earthquake can have impacts far beyond the local area, so can damage to an airport, particularly one of the principal international airports in the Bay Area.

Focus on Major Airports

Although the focus of this report is on the three major airports, other airports are also discussed in the context of the potential problems at these facilities in comparison to the three international airports.

Other Emergency Planning Efforts

ABAG held a series of five subregional workshops discussing hypothetical road and rail closures resulting from selected scenario earthquakes in October and November 1998. "Tabletop" disaster drills and extensive discussion led to identification of the major issues, interagency dependencies, and areas of potential conflict likely to face transportation providers, governments, utilities and businesses as they struggle to address the transportation impacts after a large earthquake. The ***Riding Out Future Quakes – Ideas for Action*** report (Perkins and others, 1999b) is both the proceedings of those workshops, as well as a tool to inspire innovative planning for minimizing transportation disruption following future earthquakes. One conclusion of these workshops was that airports are critically important in the region's response and recovery to earthquakes.

At the same time, MTC is continuing to test and refine the Trans Response Plan (TRP) which integrates response and recovery efforts among all modes of transportation. The TRP coordinates the activities of MTC, Caltrans, State and local Offices of Emergency Services, and other transportation providers, including transit agencies and airports.

The information in this report will hopefully serve to improve earthquake emergency planning at and among airports.